LAWRENCE LIVERMORE NATIONAL LABORATORY 7000 EAST AVENUE, L-198, LIVERMORE, CALIFORNIA, 94550 Prepared by LLNL under Contract DE-AC52-07NA27344

DATE: **June 30, 2018**

SUBJECT: Report of Foreign Travel to Paris, France

TO: Dr. Angela Chambers, USDOE Nuclear Criticality Safety Program Manager, National Nuclear Security Administration, NA-511

FROM: Catherine Percher, Nuclear Criticality Safety Division, Lawrence Livermore National Laboratory

MEETING TITLE:

30th Meeting of the Working Party on International Nuclear Data Evaluation Cooperation (WPEC) and IRSN/LLNL Collaboration Meeting

MEETING LOCATION:

Organization for Economic Cooperation and Development (OECD) Headquarters, Paris, France

MEETING DATES: May 11-18, 2018

ATTENDEES ON BEHALF OF NCSP:

Catherine Percher and David Heinrichs

MEETING BENEFIT TO NCSP:

The WPEC provides a forum for collaboration between international nuclear data efforts. There are several subgroups (SG) that are working on technical issues in common cause with the NCSP's interests. Catherine Percher is a member of SG-46, *Efficient Use of Integral Experiments for Nuclear Data Validation*, and attended meetings during the week to support this group. The NCSP funds LLNL to design new critical experiments. As nuclear data is validated and adjusted based on critical experiments, Percher's participation in this subgroup provides valuable information from the nuclear data community on the usage of benchmarks and the needs for critical experiments, which will enable her to design better experiments to inform nuclear data. The NCSP also funds an LLNL/NCState collaboration to generate new Thermal Scattering Laws (TSLs) for criticality safety applications. David Heinrichs participated in SG-42, *Thermal Scattering Kernel: Measurement, Evaluation, and Application*. Percher and Heinrichs both participated in SG-45, *Validation of Nuclear Data Libraries (VaNDaL)*, a subgroup devoted to creating a quality-assured selection of benchmark input files (mostly from ICSBEP benchmarks) for nuclear data testing, but could also be used as a certified validation set for criticality safety purposes.

In addition, the travelers met with IRSN staff to discuss and plan continued NCSP work tasks, including the TEX experimental collaboration, slide rule calculations, and the International Nuclear Accident Dosimetry Intercomparison.

MEETING PURPOSE:

The Working Party on International Nuclear Data Evaluation Co-operation (WPEC) was established to promote the exchange of information on nuclear data evaluations, measurements, nuclear model calculations, validation, and related topics, and to provide a framework for co-operative activities between international nuclear data projects. The Working Party assesses the needs for nuclear data improvements and addresses those needs by initiating joint evaluation and/or measurement efforts through its different sub-groups. Catherine Percher is a member of SG-46, *Efficient Use of Integral Experiments for Nuclear Data Validation*, and attended meetings during the week to support this group. David Heinrichs participated in SG-42, *Thermal Scattering Kernel: Measurement, Evaluation, and Application*. Percher and Heinrichs both participated in SG-45, *Validation of Nuclear Data Libraries (VaNDaL)*, a subgroup devoted to creating a quality-assured selection of benchmark input files (mostly from ICSBEP benchmarks) for nuclear data testing, but could also be used as a certified validation set for criticality safety purposes.

SG-42

LLNL is currently collaborating with NCState and the US Naval Nuclear Laboratories to create and test new thermal scattering laws, a collaboration which has been very successful and has resulted in the inclusion of several new TSL evaluations incorporated into ENDF/B-VIII (graphite, polyethylene, lucite, ice). SG-42, *Thermal Scatterine Kernel: Measurement, Evaluation, and Application*, is currently in its final year as a subgroup and has thus largely finished the work of the subgroup. This meeting was largely focused on organizing the final report.

SG-45

Testing of nuclear data libraries relies on validation suites that are often largely reliant on critical benchmarks. The goal of SG-45, *Validation of Nuclear Data Libraries (VaNDaL*), is to produce an international standardized, quality benchmark validation repository that could benefit the nuclear data library testing efforts. The work of this subgroup in very much in line with the validation intercomparison work LLNL, LANL, ORNL, and IRSN are currently engaged in and would also result in better benchmarks for nuclear criticality safety code validation. During this kick-off meeting for the subgroup, discussions centered around infrastructure (how/where to host the working group files and validation cases), use cases (which largely focused on critical benchmarks, although also discussed other sources of validation cases), and deliverables (goals for the coming year, including software tools for automatically running cases and who was willing to share benchmarks). LLNL expects to participate by leveraging our existing work with IRSN and providing COG benchmarks for data testing.

SG-46

Critical benchmarks and other integral experiments have long been used by nuclear data evaluators in one of two ways: for validation of a nuclear data library (testing how well the library performs) and for nuclear data adjustment (changing nuclear data to better fit the experimental results). SG-46, *Efficient and Effective Use of Integral Experiments for Nuclear Data Validation,* will attempt to provide nuclear data evaluators guidance on which integral experiments are appropriate to use in nuclear data validation, with due treatment of compensating effects and informed by sensitivity coefficients. During the subgroup meeting, a number of presentations were given regarding this subject. One highly relevant presentation was given by K. Yokoyama of the Japan Atomic Energy Agency that detailed the results of an IAEA expert consultants group on the use of Integral Data in Nuclear Data Evaluation. The main take-aways for

using critical experiments for nuclear data adjustment were that the experiments should contain a minimum number of materials, be able to be modelled accurately, and designed to be maximally sensitive to individual reaction channels (scattering vs fission, etc). Other, more complicated critical benchmarks were deemed inappropriate for nuclear data adjustment, and thus should only be used for validation.

WPEC Meeting Schedule from OECD NEA WPEC Website

Timetable

Detailed agendas for the sessions will be made available in due course through this webpage

		CC 24	Auditorium	Chateau E	CC 20	CC 4
Monday May 14	09:00 - 12:30			SG-45 (VANDAL)		
	14:00 - 18:00				SG-44 (Covariances)	
Tuesday May 15	9:00 - 12:30		Joint Session SG 44 / SG 46		SG-42 (TSL data)	
	14:00 - 18:00		Joint Session SG-42 / SG-44 / GNDS		SG 39 / SG 46 (I.E. adjustment, ND validation)	
Wednesday May 16	9:00 - 12:30	GNDS (SG-B)	SG-42 (TSL data)			
	14:00 - 18:00	SG-43 (GNDS Code Infrastructure)		HPRL (SG-C)		
Thursday May 17	9:00 - 18:00				WPEC*	
Friday May 18	9:00 - 18:00					WPEC*

**Participation to these meetings is for official representatives only.*